

What is claimed is:

1. An electron beam processing method for processing an organic material film formed on a surface of an object to be processed by using an electron beam, wherein the electron beam is irradiated onto the organic material film through a hydrocarbon radical generating gas.
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2. The method of claim 1, wherein the hydrocarbon radical generating gas is a low molecular weight hydrocarbon-based gas.
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3. The method of claim 2, wherein the low molecular weight hydrocarbon-based gas is set to have a partial pressure equal to or greater than 0.01 Torr.
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4. The method of claim 2, wherein the low molecular weight hydrocarbon-based gas is a methane gas.
- 20 5. The method of claim 1, wherein the organic material film has a low dielectric constant.
6. The method of claim 1, wherein the organic material film is made of an organic silicon compound.
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7. An electron beam processing apparatus comprising:

a hermetically structured processing chamber;

a mounting table disposed inside the processing chamber for mounting thereon an object to be processed having an organic material film formed on a surface thereof;

5 a plurality of electron beam tubes disposed above the mounting table;

a gas supply unit for supplying a hydrocarbon radical generating gas into the processing chamber; and

10 a depressurization unit for reducing an inner pressure of the processing chamber,

wherein the electron beam tubes irradiate electron beams onto the organic material film through the hydrocarbon radical generating gas.

15 8. The apparatus of claim 7, wherein the hydrocarbon radical generating gas is a low molecular weight hydrocarbon-based gas.

9. The apparatus of claim 8, further comprising a member 20 for setting a partial pressure of the low molecular weight hydrocarbon-based gas to be equal to or greater than 0.01 Torr.

10. The method of claim 8, wherein the low molecular 25 weight hydrocarbon-based gas is a methane gas.

11. The method of claim 9, wherein the low molecular weight hydrocarbon-based gas is a methane gas.

12. The apparatus of claim 7, wherein the organic material
5 film has a low dielectric constant.

13. The apparatus of claim 7, wherein the organic material film is made of an organic silicon compound.